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Docket No. 217522US0PCT
IN RE APPLICATION OF: Tadahiko FURUTA, et al.
SERIAL NO: 10/019,283
FILED: January 2, 2002
FOR: TITANIUM ALLOY MEMBER



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COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313

SIR:

Transmitted herewith is an amendment in the above-identified application.

- ☒ No additional fee is required
- ☐ Small entity status of this application under 37 C.F.R. §1.9 and §1.27 is claimed.
- ☒ Additional documents filed herewith: Elements of X-ray Diffraction, 2d Edition, pp. 308-316
Declaration Under 37 C.F.R. 1.132 (5pp., executed)

The Fee has been calculated as shown below:

CLAIMS	CLAIMS REMAINING		HIGHEST NUMBER PREVIOUSLY PAID	NO. EXTRA CLAIMS	RATE	CALCULATIONS
TOTAL	14	MINUS	20	0	x \$18 =	\$0.00
INDEPENDENT	1	MINUS	4	0	x \$86 =	\$0.00
		<input type="checkbox"/> MULTIPLE DEPENDENT CLAIMS			+ \$290 =	\$0.00
		TOTAL OF ABOVE CALCULATIONS				\$0.00
		<input type="checkbox"/> Reduction by 50% for filing by Small Entity				\$0.00
		<input type="checkbox"/> Recordation of Assignment			+ \$40 =	\$0.00
		TOTAL				\$0.00

- ☐ A check in the amount of \$0.00 is attached.
- ☐ Credit card payment form is attached to cover the fees in the amount of \$0.00
- ☒ Please charge any additional Fees for the papers being filed herewith and for which no check or credit card payment is enclosed herewith, or credit any overpayment to deposit Account No. 15-0030. A duplicate copy of this sheet is enclosed.
- ☒ If these papers are not considered timely filed by the Patent and Trademark Office, then a petition is hereby made under 37 C.F.R. §1.136, and any additional fees required under 37 C.F.R. §1.136 for any necessary extension of time may be charged to Deposit Account No. 15-0030. A duplicate copy of this sheet is enclosed.

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DOCKET NO: 217322US0PCT

IN THE UNITED STATES PATENT & TRADEMARK OFFICE

IN RE APPLICATION OF :

TADAHIKO FURUTA, ET AL

: EXAMINER: SHREHAN, J.

SERIAL NO: 10/019,283 :

FILED: JANUARY 2, 2002

: GROUP ART UNIT: 1742

FOR: TITANIUM ALLOY MEMBER AND :
PROCESS FOR PRODUCING THE SAME

DECLARATION UNDER 37 C.F.R. 1.132

COMMISSIONER FOR PATENTS
ALEXANDRIA, VIRGINIA 22313-1450

SIR:

I, Tadahiko FURUTA, a citizen of Japan, hereby declare and state that:

1. I graduated from Suzuka College of Technology in 1982.

2. I have been employed by Kabushiki Kaisha Toyota Chuo Kenkyusho since 1982,
where I have been engaged in materials science and engineering.

3. The following experiments were carried out by me or under my direct control to
compare Inventive Sample No. A (Ti-30Nb-10Ta-5Zr including 0.26 wt% O) with
Comparative Sample D (sample No. TA22 (Ti-35.3Nb-4.9Ta-7.2Zr) of U.S. Patent No.
5,871,595 ("Ahmed")).

Experimental Method

4. Samples were produced by a powder metallurgy method using raw powders of Ti, manufactured by TOHO TITANIUM (TC459 (-#350)), and of Nb, Ta, and Zr, manufactured by KOUJUNDOKA GAKU (-#350). To form Comparative Sample ①, Ti, Nb, Ta and Zr powders were first mixed to form a mixed powder. Each mixed powder was fully agitated by a shaker and then subjected to rotational mixing in a rotational ball mill mixing vessel for 2 hours. After that the mixed powder was filled in a silicon rubber mold and compacted by a CIP pressing machine at a pressure of 4 ton/cm². Then sintering was carried out in a vacuum of 10⁻⁶ torr at 1300°C × 16 hours. After the sintering, hot forging was carried out at 1050°C. After carrying out a solution heat treatment at 900°C for 30 minutes, cold working with 90% reduction in area was carried out, and then a test piece having a plane portion of 2mm × 10mm was prepared. Each test piece was subjected to a tensile test at room temperature. The tensile test was carried out by using an Instron universal testing machine at an early strain rate of 5 × 10⁻⁴/sec. Young's modulus was estimated by attaching a strain gage to each test piece. Comparative Sample ① had an oxygen amount of not more than 0.2%.

Results of Comparative Experiments

5. The attached FIGS. A-B compare Inventive Sample No. A with Comparative Sample ① (i.e., Abried's TA22 (Ti-35.3Nb-4.9Ta-7.2Zr) alloy).

6. FIG. A shows that Comparative Sample ① has a tensile strength of 590MPa, a tensile elastic limit strength (0.2% proof stress) of 530MPa, a Young's modulus of 55GPa, and an elastic deformation of approximately 1%. The tensile elastic limit strength of Comparative Sample ① is significantly lower than that of Inventive Sample No. A.

7. FIG. B magnifies the low strain region of FIG. A to highlight the low strain differences between Inventive Sample No. A and Comparative Sample D. Up to approximately 0.7% strain, the stress-strain curve for Comparative Sample D remains linear (no deviation from a straight line). In contrast, at low strain the stress-strain curve for Inventive Sample No. A is non-linear (sight down the curve).

8. Because at low strain the stress-strain curves for Comparative Sample D is linear while the stress-strain curve for Inventive Sample No. A is non-linear, the stress-strain curve for Comparative Sample D is qualitatively and significantly different than the stress-strain curve of Inventive Sample No. A.

9. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of this application or any patent issuing thereon.

10. Further declarant saith not.

Date: Nov. 25, 2003

Tadahiko Furuta

Tadahiko FURUTA

Attachments:
FIGS. A and B